

- Fig. 6. *a* to *d*, "Swarmer," swimming in water, assuming various figures of a Eugleniform character. Magn. 390 diams.
- Figs. 7 and 7 *sp*. A portion of the capillitium of *Æthaliium septicum*. At *b* is a collection of calcareous matter; *sp*. spores of the same. Magn. 390 diams.
- Fig. 8. *a* to *e*. Spores of *Æthaliium septicum*: *a* to *c*, escape of "swarmers" from their enclosing integument; *c'*, the swarmer immediately after its escape; *d*, *d'*, two swarmers furnished with two cilia; *e*, a third with one cilium only, as usual. Magn. 390 diams.
- Fig. 9. A large Amœba of *Æthaliium septicum*.
- Figs. 10-13. Amœbæ of the same organism, of various sizes, exhibiting their progressive growth.
- Fig. 14. A large Amœba of *Æthaliium septicum*, crawling in the direction of the arrow shown alongside, and showing internally three large vacuoles, but no foreign ingesta. Length $\frac{1}{10}$ "'; width $\frac{1}{4}$ "'. Magn. 390 diams.
- Fig. 15. An encysted Amœba of the same being, having seven spores of *Æthaliium* within it, observed to rotate with the substance around them. Magn. 390 diams.
- Fig. 16. A slightly magnified view of a section of the spore-producing portion of an old *Æthaliium septicum*, after being treated with alcohol. The spore-producing sarcode-cords are swollen, and distinguished into a cortical and a medullary portion; much of the former, however, has been lost in making the section.
- Fig. 17. A small segment of a magnified view of the sarcode-ramifications of *Æthaliium septicum*, showing the secondary pseudopodous processes, *a*, on the margin. Magn. 90 diams.
- Fig. 18. A portion of the network of sarcode-fibres of *Æthaliium septicum*, expanded on a glass slide, and viewed by reflected light; of the natural size.
- Fig. 19. *a* to *n*. Spores and their contained or emerged swarmers of *Trichia varia*. Some seem of a Eugleniform figure, with a filament; and others Amœbiform, with or without a filament.

XXVI.—Notes on Plectopylis, a group of Helicidæ distinguished by several internal plicate Epiphragms; with the Characters of a new Species. By W. H. BENSON, Esq.

AN examination of the interior of specimens of *Helix Achatina*, Gray, received from Moulmein, has revealed a singular and interesting internal structure in that shell. This formation occurs also in *H. Cyclaspis*, B.; the dextrorse variety of *H. refuga*, Gould, from the Tenasserim Valley; the species from the banks of the Irawadi (*H. Leiophis*, B), previously supposed to be a small variety of *refuga*; and in a second group from Darjiling and the Khasia Hills, consisting of *H. plectostoma* and *H. Pinacis*, B.

The longest-known shells of the group have been classed with various forms by systematic authors. *Helix Achatina* and *H. refuga* were referred by Albers to *Atopa*, which also includes the Cingalese *H. Rivoli*, Desh., and *H. erronea*, Albers, possess-

ing no true plicate barriers, and furnished with only a few lamellæ running longitudinally to a moderate distance within the aperture. Pfeiffer refers the whole of these shells to *Ophio-gyra*; and Messrs. H. and A. Adams include them all in *Corilla*, as a section of *Anchistoma*. Again, *Helix plectostoma*, B., is referred by Albers to *Gonostoma*, synonymous with *Polygyra*, Say and Pfeiffer, and with *Polygyra* as a section of *Anchistoma*, H. & A. Adams. These include *Helix obvoluta*, *H. angigyra*, *H. Corcyrensis*, and other shells which exhibit no traces of pylaic plication. It therefore becomes necessary to separate the first division from *H. Rivolii* and its congeners, and the second from *H. obvoluta* and its allies. Together they will form a natural group divisible into three sections conformably with the varying structure of the plicate pylæ; and as the type of the first group was announced in a former paper as being ovoviviparous, there may exist grounds for generic separation from *Helix* equally strong with those which authorize the distinction of *Partula* from *Bulimus*. I name the group

Plectopylis.

Testa plerumque sinistrorsa, late umbilicata, subdiscoidea, depressa vel conoideo-depressa; apertura plica parietali callosa lamellam horizontalem sæpe emittente, intus pylis sive epiphragmatibus pluribus distantibus plicatis (prima ab apertura plus minusve remota) obstructa.

The typical section comprises species in which the pylaic epiphragms consist of a strong vertical parietal lamina, with a tortuous support on the inner side, and giving out towards the aperture various horizontal lamellæ, another independent horizontal plica crossing near its base; while the palatal portion consists of three horizontal plicæ above, one below, and a large transverse vertical lamina which corresponds with and crosses behind the outer portion of the dichotomous parietal lamina. It comprehends

Helix Achatina, Gray.

— *Cyclaspis*, B.

The second section consists of species in which the parietal vertical lamina is more simple than in the first, being scarcely dichotomous, but provided with anterior lamellæ; while there are six long or short, straight or sinuous, horizontal palatal plicæ, the fifth of which in one species has a tendency to simulate the vertical lamina of the previous section, and some double plicæ in the other point towards the 3rd section. It comprehends

Helix refuga, Gould, var. *dextrorsa*.

— *Leiophis*, B., n. s.

The 3rd section is distinguished by having the epiphragm near the aperture, and by a still more simple parietal lamina placed vertically, and with a separate horizontal plica below, as in the previous sections, but unfurnished with anterior lamellæ. The palatal plicæ are six in number, several are backed by a second more oblique row, and the vertical lamina present in the first section is deficient. It comprehends

Helix plectostoma, B.

— *Pinacis*, B.

The pylaic plicæ may be distinctly viewed by filing across the last whorl, a little in front of the barrier, so as not to injure the palatal plicæ nor the aperture of the shell, care being taken first to ascertain the distance from the aperture by means of a flexible lamina of quill. The slit may be cautiously enlarged, according to circumstances, and the back of the epiphragm may be examined by a similar process beyond it.

The following characters require to be added to those hitherto recorded:—

1. *Helix Achatina*, Gray.

Janua pliciformi fauciali prima remota, lamina 1 parietali magna verticali bifurcata, postice sinuosa intrante, antice lamellas 2 emitte, mediana aperturam attingente, inferiore mediocri, plica 1 basali horizontali elongata; plicis palatalibus 3 superioribus, 1 basali intransibus, lamina 1 verticali lata elongata intersita.

The pylæ or barriers are reproduced at certain distances in the interior whorls; and the more distant have only a short central lamella, occasionally obsolete, proceeding anteriorly from the parietal lamina, in addition to the basal plica.

Found at the Farm Caves near Moulmein.

2. *Helix Cyclaspis*, B.

(Annals Nat. Hist. March and April, 1859.)

Janua pliciformi fauciali prima remota, lamina 1 parietali magna obliqua subbifurcata, antice lamellam unicam inferiorem brevem emittente, plica 1 basali spirali; plicis 3 palatalibus superioribus fortibus elongatis sinuosis, 1 basali intransibus, lamina 1 obliqua satis magna intersita.

In this shell the large parietal lamina is not so distinctly and widely double as in *H. Achatina*, and it gives off no medial anterior lamella to connect it with the shortened apertural lamella.

Mr. Theobald's single specimen was much worn. Examples in good condition, procured by Capt. J. C. Haughton at the

Farm Caves near Moulmein, enable me to add the characters of the sculpture and colour.

Testa — superne oblique rugoso-plicata, subtus læviore, umbilicum versus spiraliter striata, superne albida, castaneo-strigata et variegata, subtus fusco-castanea, umbilicum versus albida.

The lamella proceeding from the pylaïc parietal plait and the second superior palatal lamina are both visible from the aperture.

3. *Helix Leiophis*, B., n. s.

Testa sinistrorsa, late et profunde umbilicata, subdiscoidea, superne planata, interdum omnino plana, vix solidula, oblique et arcuatim rugoso-striata, lineis nonnullis spiralibus decussata, sub epidermide scabra, fusco-cornea, albida; spiræ apice vix elevatiusculo lævigato, sutura impressa; anfractibus $5\frac{1}{2}$ – $6\frac{1}{2}$ angustis, ultimo supra peripheriam angulato, antice valde deflexo, basi rotundata, apertura valde obliqua subhorizontali, lunari, peristomate reflexo albido, marginibus lamina sinuosa elevata, medio lamellam profunde intrantem, usque ad januam attingentem emittente junctis. Janua pliciformi fauciali prima remota; lamina 1 parietali verticali simplici forti lamellam aperturalem valde elongatam superne emittente, infra eam lamellis duabus brevibus (a lamina spatio brevi separatis) munita; plicis 6 palatalibus intrantibus, quinta robustiore obliqua.

Diam. major 11–14, minor 8–11, alt. 3 – $4\frac{1}{2}$ mill.

Hab. ad Kwadouk, prope Thyet Mio.

Distinguished externally from the typical *H. refuga*, Gould, and its dextrorse variety by its narrower whorls, absence of angulation on the lower side of the last whorl, its more oblique and nearly horizontal aperture, and by the circumstance of no lower lamella being visible from the aperture, as in that variety*. Internally it is distinguished by the shortness and simplicity of the six palatal plaits, and by the obliquity of the fifth, which gives some token of an approach to the palatal lamina of the first section; also by possessing two short horizontal lamellæ, arising near but not touching the upright parietal lamina, in addition to the long lamella which connects that lamina with the aperture, as in *Helix Achatina*; whereas *H. refuga*, var. *dextrorsa* has but a single lengthened lamella proceeding from the lower part of the pylaïc parietal plait, and the long apertural one is not connected with that plait, taking its rise close to it.

4. *Helix refuga*, Gould, var. *dextrorsa*.

Janua pliciformi fauciali prima remota; lamina 1 parietali magna

* The internal barrier of *H. refuga* requires examination, and may prove it to be distinct from the supposed dextrorse variety. In the typical shell the lower parietal lamella is said to be invisible from the aperture, and may be altogether wanting.

verticali simplici antice lamellam 1 inferiorem elongatiusculam emittente, lamella superiore valde elongata aperturæ laminam parietalem non omnino attingente, plica basali obsoleta; plicis palatalibus intransibus 6, tribus superioribus et basali elongatis sinuosis, quarta et quinta brevibus, postice plicis obliquis distinctis munitis.

This form occurs at Phye-thán, in the Tenasserim Valley. It exhibits an approach to the next section in some of the palatal plaits.

5. *Helix plectostoma*, B.

Janua pliciformi fauciali prima minime profunda, ab apertura partim apparente; lamina 1 parietali verticali simplici, lamellis nullis munita, plica basali brevi; plicis sex palatalibus, superiore basali-que simplicibus, secunda vix duplicata, tertia, quarta quintaque postice plica obliqua munitis.

This form inhabits Darjiling and the Khasia Hills.

6. *Helix Pinacis*, B.

(Annals Nat. Hist. April 1859, p. 268.)

Janua pliciformi fauciali prima profundiuscula, ab apertura vix apparente. Lamina et plica basali ut in specie antecedente, plica basali nonnunquam obsoleta; plicis sex palatalibus, prima et secunda supernis plus minusve simplicibus, tertia vix duplicata, quarta, quinta basali-que duplicatis, hujus plica secunda ad latus concurrente, nec postica.

It differs from *H. plectostoma* in the formation of the chief palatal plaits, and in having a supplementary parallel basal fold.

This species is found rarely near Darjiling. A minute variety occurs among Mr. W. T. Blanford's specimens of *H. plectostoma*, $3\frac{1}{2}$ to $4\frac{1}{2}$ millimetres in the larger diameter.

There appears to be a regular gradation from *H. Achatina* to *H. Pinacis*, through *Cyclaspis*, *Leiophis*, *refuga*, and *plectostoma*, each species presenting peculiarities in the details of the pylaic plication.

Dr. L. Pfeiffer attributes only three palatal plates to *Helix erronea*, Albers. On filing into the shell behind the lamellæ, a fourth is found, as well as in *H. Rivolii*, Desh. The arrangement of the lamellæ differs in the two species.

On a close examination of the little Cingalese *Helix clathrata*, Pfr. (*H. Puteolus*, B.), a sparsely toothed lamellation becomes apparent internally: it is seen through the transparent lower side in two parallel lines, as many as six teeth occurring in a group; occasionally some are visible from the aperture. Pfeiffer refers this shell to *Patula*.

Cheltenham, March 1, 1860.